EUROPEAN PATENT OFFICE

Patent Abstracts of Japan

PUBLICATION NUMBER : 09109306
PUBLICATION DATE : 28-04-97

APPLICATION DATE : 17-10-95
APPLICATION NUMBER : 07294910

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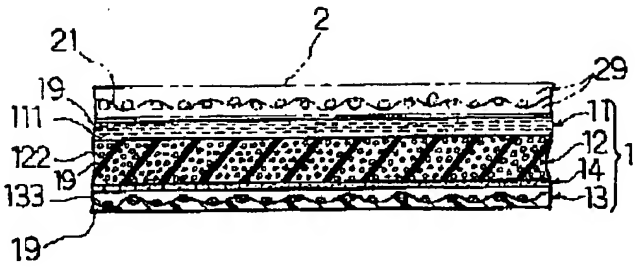
INT.CL. : B32B 5/24 B32B 5/28 B32B 7/10
B60J 7/12 // D06M 15/00 D06M 17/00

TITLE : TOP FOR VEHICLE



ABSTRACT : PROBLEM TO BE SOLVED: To improve an insulation effect by bonding an insulating material which is composed of an insulating layer consisting of a heat reflection layer comprising metal flakes placed inside and a foamed plastic material placed in the lower part of the reflection layer and a ground fabric placed in the lower part of the heat-insulating layer and a top ground fabric together through the reflection layer of the insulating material.

SOLUTION: A material which is in a state in which a raw material which generates nitrogen gas is mixed is set in the inside of a thermoplastic resin 19, and on it is placed a thing which is in a state in which the resin 19 is made a base, and a heat reflection material 111 of aluminum alloy flakes is mixed inside. Rolling is implemented at an appropriate temperature, and a raw material is formed in which an insulating layer 12 of foamed plastic having closed cells 122 and a heat reflection layer 11 in which aluminum alloy flakes are mixed are laminated. A ground fabric 13 which has a cloth 133 as a base and back- coated with the resin 19 is bonded to the side of insulating layer 12 through an adhesive, and an insulating material 1 of this constitution is bonded to the inside of a roof ground fabric coated with a thermoplastic resin 29 through the reflection layer 11.

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Publication No.: 9-109306

Publication Date: April 28, 1997

Application No.: 7-294910

Application Date: October 17, 1995

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Title of the invention: Top for vehicle

CLAIMS:

1. A top cover for a vehicle comprising a multilayered heat insulation material and a topcover-basecloth, wherein said topcover-basecloth is composed of a canvas coated by a thermoplastic resin and is used as a base to which said heat insulation material is connected (joined), wherein said heat insulation material comprises a heat reflection layer, a heat insulation layer under said heat reflection layer and a base cloth under said heat insulation layer, wherein said heat reflection layer is composed of a thermoplastic resin as a base material and metal flakes as a heat reflection material mixed in the resin, said heat insulation layer is composed of a foamed plastic material containing the closed cells, and said base cloth is composed of fabric coated by thermoplastic resin, wherein said topcover-basecloth and said heat insulation material are connected via said heat reflection layer in the heat insulation material.
2. A top cover for a vehicle as claimed in claim 1, wherein nitrogen gas is sealed in the closed cells formed in the foamed plastic material that composes the heat insulation layer of said heat insulation material
3. A top cover for a vehicle as claimed in claim 1 or claim 2, said heat reflection material in the heat reflection layer composed of an aluminum alloy flake and said heat reflection material is positioned in stratiform and in parallel.
4. A top cover for a vehicle of any preceding claims, said topcover-basecloth and said heat insulation material are connected by welding the thermoplastic resin material composing said topcover-basecloth and the thermoplastic resin material composing

the heat reflection layer in the heat insulation material.

SPECIFICATION

Detailed Description of The Invention

(0001)

Field of Technology

The present invention relates to a top cover for a vehicle, such as a canvas top of convertible and specifically relates to the top cover for the vehicle with good heat insulation having a layered heat insulation material inside of it.

(0002)

Prior Art

A conventional top cover for a vehicle comprises a base material of a canvas composed of a fabric of polyester fibers coated by thermoplastic resin material such as polyvinyl chloride (PVC).

(0003)

Problem Solved by the Present Invention

Aforementioned conventional product comprises a canvas, of which back is coated with a thermoplastic resin material such as polyvinyl chloride (PVC), so as to improve its strength and durability. Rainwater leak is also prevented by backcoating with the thermoplastic resin material. However, this coating is not sufficient with respect to heat insulation. Particularly in recent years a vehicle with a top cover such as a canvas top vehicle is equipped with a refrigeration unit (air conditioner). Accordingly heat insulation in this vehicle with the top cover becomes an issue. In order to solve this problem an object (problem) of the present invention is to provide the top cover for the vehicle, in which a multilayered heat insulation material containing an aluminum alloy flake is placed.

(0004)

Method to Solve the Problem

In order to solve aforementioned problem, the following method is used in the present invention. Namely, the present invention provides a top cover for a vehicle comprising a

multilayered heat insulation material and a topcover-basecloth, wherein said topcover-basecloth is composed of a canvas coated by a thermoplastic resin and is used as a base to which said heat insulation material is connected (joined), wherein said heat insulation material comprises a heat reflection layer, a heat insulation layer under said heat reflection layer and a base cloth under said heat insulation layer, wherein said heat reflection layer is composed of a thermoplastic resin as a base material and metal flakes as a heat reflection material mixed in the resin, said heat insulation layer is composed of a foamed plastic material containing the closed cells, and said base cloth is composed of fabric coated by thermoplastic resin, wherein said topcover-basecloth and said heat insulation material are connected via said heat reflection layer in the heat insulation material.

(0005)

The present invention provides the following effects. Namely, since an inner space such as an interior room of vehicle is formed with a top cover (top cover for vehicle) having the heat insulation material as an inner surface, heat from outside such as heat from direct sunshine (infrared light) is shielded by said heat insulation material. Accordingly, temperature raise in the interior room of vehicle by said direct sunshine could be avoided. Practically, heat ray (infrared light) from the direct sunshine is reflected at the heat reflection layer in the heat insulation material and is not able to transmit into the interior room of vehicle. In particular, said heat reflection layer comprises a metal alloy flake as a heat reflection material and has very high value in reflectivity against incident infrared light as compared with a conventional particle as the heat reflection material (infrared reflection material).

(0006)

A heat insulation layer composed of a foamed plastic material containing the closed cells is placed under the heat reflection layer. Accordingly, said heat insulation layer shows excellent shield capability against the transmission of infrared light. In this way, a material in the present invention has excellent heat insulation property as compared with conventional one so that temperature raise in an interior room of vehicle by transmission of infrared light from direct sunshine can be prevented in advance. Thus,

because of excellent heat insulation, cooling efficiency of the interior room of vehicle is increased when a refrigeration unit (air conditioner) is operated in the interior room of vehicle.

(0007)

Next, the invention in claim 2 is described. Namely, the present invention in claims 2 provides the top cover for a vehicle as claimed in claim 1, wherein nitrogen gas is sealed in the closed cells formed in the foamed plastic material composing the heat insulation layer of said heat insulation material. This structure yields excellent heat reflection capability (infrared light reflection capability) same as in the invention in Claim 1. In addition to this capability, much higher heat insulation capability is achieved. Namely, nitrogen gas with excellent heat insulation is sealed into the closed cells in the heat insulation layer of the foamed plastic material so that much higher heat insulation capability, namely much higher heat shielding capability is achieved as compared with use of air which is sealed into a general foamed plastic material.

(0008)

Next, the invention in claim 3 is described. Namely, the present invention in claim 3 provides the top cover for a vehicle as claimed in claim 1 or claim 2, said heat reflection material in the heat reflection layer composed of an aluminum alloy flake and said heat reflection material is positioned in stratiform and in parallel. Use of this arrangement can improve reflectivity against heat ray (infrared light) at said heat reflection layer. Namely, incident heat ray (infrared light) is randomly scattered in a conventional mixture comprising a metal in particle like titanium oxide (TiO_2). On the other hand, the heat reflection material in the present invention is an aluminum alloy flake and placed in stratiform and in parallel so that incident heat ray (incident infrared light) is orderly reflected. Therefore, reflection efficiency against heat ray by the heat reflection layer in the present invention is much higher value as compared with a conventional mixture.

(0009)

Next, the invention in claim 4 is described. The present invention in claim 4 provides the top cover for a vehicle of any preceding claims, said topcover-basecloth and said heat

insulation material are connected by welding the thermoplastic resin material composing said topcover-basecloth and the thermoplastic resin material composing the heat reflection layer in the heat insulation material. Specifically, a part of both products mentioned above is contacted each other and thermally melted, for example, with high frequency heating to weld each other. By the above process, a welded area between the topcover-basecloth and the heat insulation material does not form seams as in a sewing method and eliminates a penetration of water through seams. Thus, in the present invention, connecting of the topcover-basecloth and the heat insulation material is simply done by a method of welding and combined (joined) product is formed free of seam so that there is no risk of rain leaking through the roof.

(0010)

Embodiment of the Invention

Embodiment of the present invention is explained in Figure 1 to Figure 4. As shown in Figure 1, the structure is based on heat insulation material 1 and topcover-basecloth 2 is placed in an inside of said heat insulation material, wherein the heat insulation material 1 is able to reflect and shield heat ray (infrared light) and the topcover-basecloth.

(0011)

In the basic structure, aforementioned heat insulation material 1 is composed of the heat reflection layer 11, to reflect heat ray (infrared light); the heat insulation layer 12 laminated under said heat reflection layer; and the base cloth 13 laminated under said heat insulation layer 12 bound by an adhesive material (adhesive layer) 14. And furthermore, aforementioned heat reflection layer 11 is composed of heat reflection material 111, such as an aluminum alloy flake and thermoplastic resin matrix 19, such as polyvinyl chloride. The heat insulation layer 12, which is laminated under the heat reflection layer 11 composed of a foamed plastic material comprising the closed cells 122 dispersed in the thermoplastic resin matrix such as polyvinyl chloride. The closed cells 122 can contain the sealed nitrogen gas (N_2) possessing excellent heat insulation.

(0012)

The heat reflection layer, 11, and the heat insulation layer 12 are combined (joined) in a

layer by a following method. Namely, a material, in which a nitrogen gas generating material is mixed with the thermoplastic resin material such as PVC, is placed at first. The another material is placed on the above material. Said material comprises the heat reflection material 111, such as an aluminum alloy flake dispersed in a thermoplastic resin material such as polyvinyl chloride same as a base matrix is placed. And this two-layered material is pressed with a roll (for example, calendering process) at proper temperature to form a laminated material, which is composed of a foamed plastic material layer and an aluminum alloy flake containing layer. Calendering processing yields a laminated material composed of the heat reflection layer 11 and the heat insulation layer 12 and at the same time, aforementioned pressing and molding with a roll makes the heat reflection material 111 that is an aluminum alloy flake dispersed in aforementioned heat reflection layer 11 configured in stratiform and in parallel so as to improve reflection efficiency against heat ray (infrared light).

(0013)

The base cloth 13 is bound (joined) in lamination to a bottom side (heat insulation layer) of the laminated heat reflection layer 11 and heat insulation layer 12 by an adhesive material (adhesive layer) 14. This base cloth 13 comprises a fabric 133 as a base material. The fabric is composed of chemical fibers such as polyester or nylon or natural fibers such as cotton, wherein the fabric 133 is coated with a thermoplastic resin material 19 such as polyvinyl chloride (PVC). Namely, the material is composed of the fabric 133 of which back is coated with the thermoplastic resin material 19.

(0014)

As shown in Figure 1, the heat insulation material 1 is bound (joined) by a method of welding 5 on inner side of the topcover-basecloth 2 through heat reflection layer 11 to yield the top cover for a vehicle. The topcover-basecloth 2, which is a base to be connected (joined) with heat insulation material 1, comprises as a base matrix a canvas 21 of polyester fiber fabric, of which back is coated (backcoated) with the thermoplastic resin material 29, such as polyvinyl chloride (PVC). Accordingly, the backcoated thermoplastic resin material 29 is bound by a method of welding 5, such as high frequency welding, with the thermoplastic resin material 19 in the heat reflection layer

11.

(0015)

Namely, for example, as shown in Figure 2, the topcover-basecloth 2 is bound (joined) to heat insulation material 1, such that almost whole area of the inner side of the topcover-basecloth is covered with the heat insulation material 1. This structure increases heat insulation effect in an interior room of a vehicle. A practical joining structure between heat insulation material 1 and topcover-basecloth 2 has an arrangement as shown in Figure 3 and Figure 4. Namely, as shown in Figure 3, in a ceiling section contacting with a cross frame 91, a contacted area of the heat insulation material 1 is removed and a backing cloth for reinforcement 3 is placed on said removed area to prevent from damage due to friction (worn-out) with the frame cross 91. An end of the heat insulation material 1 with aforementioned removed area is joined with the topcover-basecloth 2 by a method of welding such as high frequency welding with help of the backing cloth 3. A strap 4 is bound on aforementioned backing cloth 3 by using, for example, a method of sewing 6. A planar fastener 8 of Velcro fastener is bound at an end of this strap 4. The strap 4, with this structure is wound around aforementioned cross frame 91. Furthermore, the planar fastener 8 bound at its end is pressed to fix the top cover for a vehicle with aforementioned heat insulation material 1 onto a ceiling of a vehicle with help of aforementioned backing cloth 3.

(0016)

A drawing for installation of the top cover for a vehicle onto a side of a vehicle has a setup as shown in Figure 4. Namely, the heat insulation material 1 is joined by a method of welding 5, such as high frequency welding, to an inner side of the topcover-basecloth 2 into one piece. In this situation, the backing cloth 3 for reinforcement is similarly installed by a method of welding 5 at an end of the topcover-basecloth 2 contacting with a side frame 99. Furthermore, the strap 4 is installed by a method of sewing 6 with the backing cloth 3 to form the top cover for a vehicle. An end of the top cover for a vehicle with this structure is installed with the side frame 99 with help of aforementioned strap 4. Namely, aforementioned strap 4 is wound around the side frame 99 and the planar fastener 8 of Velcro fastener installed at end of

said strap 4 is finally pressed to complete setup (installation) on the side frame 99 in aforementioned top cover for a vehicle.

(0017)

Next, the advantageous effects obtained by the embodiment of the present invention with this setup are described. Namely, an inner space of an interior room in a vehicle is composed of a top cover for a vehicle, of which inside is composed by said heat insulation material 1. Heat from outside, for instance, heat ray (infrared light) of direct sunshine is shielded by the heat insulation material 1. Therefore, temperature raise in an interior room of a vehicle by the direct sunshine can be avoided.

(0018)

Specifically, the incident heat ray (infrared light) of direct sunshine is reflected at the heat reflection layer 11 in the heat insulation material 1 and cannot transmit into an interior room of a vehicle. Particularly, aforementioned heat reflection layer 11 contains the heat reflection material 111 composed of an aluminum alloy flake and said heat reflection material 111 is arranged in stratiform and in parallel so as to improve reflection efficiency against heat ray (infrared light) in said heat reflection layer 11. Namely, a conventional material, which contains particle metal composed of titanium oxide (TiO_2), randomly scatters incident heat ray (infrared light). On the other hand, in embodiment of this example, an aluminum alloy flake is used as the heat reflection material 111 and is arranged in stratiform and in parallel so that incident heat ray (incident infrared light) is orderly reflected. Therefore, reflection efficiency against heat ray has much higher value as compared with a conventional material.

(0019)

The heat insulation layer 12 composed of a foamed plastic material containing the closed cells is placed under the heat reflection layer 12 so that said heat insulation layer 12 has excellent shielding capability against aforementioned infrared light transmitted. Particularly, in embodiment of this example, nitrogen gas (N_2), which has excellent heat insulation ability, is used as a sealed gas in the foamed plastic material composing the heat insulation layer 12 in the heat insulation material 1 so as to give much higher heat insulation capability. Namely, embodiment in this example shows much better

capability in both heat insulation and heat shielding as compared with use of air as a sealed gas in a general foamed plastic material.

(0020)

Thus embodiment of this example has better heat insulation capability as compared with conventional structure and therefore can prevent in advance an interior room of a vehicle from raising temperature caused by transmission of direct sunshine. Moreover better heat insulation capability can improve cooling efficiency in said interior room of a vehicle when a refrigeration unit (air conditioner) is operated in the interior room of a vehicle.

(0021)

In embodiment of this example, a joining of the topcover-basecloth 2 and the heat insulation material 1 is done by a method of welding 5 such as high frequency welding of the two thermoplastic resin materials (PVC), one of the thermoplastic resin material 29 is that forming said topcover-basecloth 2 and other thermoplastic resin material 19 is that forming the heat reflection layer 11 of the heat insulation material 1 so that no seam is formed at joining section between the topcover-basecloth 2 and the heat insulation material 1. Accordingly, there is no risk of leaking rain through the seam. Joining between the topcover-basecloth 2 and the heat insulation material 1 can be simply performed by a method of welding 5.

(0022)

Effects of the Invention

The present invention relates to a top cover for a vehicle comprising a multilayered heat insulation material and a topcover-basecloth, wherein said topcover-basecloth is composed of a canvas coated by a thermoplastic resin and is used as a base to which said heat insulation material is connected (joined), wherein said heat insulation material comprises a heat reflection layer, a heat insulation layer under said heat reflection layer and a base cloth under said heat insulation layer, wherein said heat reflection layer is composed of a thermoplastic resin as a base material and metal flakes as a heat reflection material mixed in the resin, said heat insulation layer is composed of a

foamed plastic material containing the closed cells, and said base cloth is composed of fabric coated by thermoplastic resin, wherein said topcover-basecloth and said heat insulation material are connected via said heat reflection layer in the heat insulation material. This structure improves not only reflection efficiency against heat ray (infrared light) by aforementioned heat reflection layer but also shielding efficiency against heat ray (infrared light) by aforementioned heat insulation layer. This gives the top cover for a vehicle with very high efficiency in heat insulation (heat shielding).

(0023)

Particularly, use of an aluminum alloy flake as the heat reflection material and its stratiform and parallel arrangement prevents the incident heat ray (infrared light) from random scattering but force orderly reflection so that reflection efficiency against the heat ray (infrared light) becomes much higher and thus the heat shielding efficiency can be improved. As a nitrogen gas (N_2) is used as a sealed gas which forms the closed cells in the foamed thermoplastic material in the heat insulation layer, lower thermal conductivity in said nitrogen gas gives much better heat insulation effect as compared with a type of conventionally sealed air.

(0024)

In the present invention, joining of the heat insulation material with the topcover-basecloth is done by a method of welding such as high frequency welding of the two thermoplastic resin materials in the topcover-basecloth and in the heat insulation material. Accordingly, a seam by sewing does not appear on outer surface of the top cover and risk of leaking through said seam is eliminated. Use of the aluminum alloy flake as the heat reflection material and the foamed plastic material in the heat insulation layer can reduce total mass of the product. Use of the foamed plastic material in a part of raw materials makes folding of said top cover for a vehicle easier so that the top cover for a vehicle can be compactly folded, detached and stored in different space.

Explanation of the Drawings

Fig.1 shows a principle structure of the present invention.

Fig.2 shows applied condition of the top of the present invention.

Fig.3 shows a cross-sectional view along A-A line in Fig.2.

Fig.4 shows a cross-sectional view along B-B line in Fig.2.

Explanation of numerals in the figures.

1: heat insulating material

11: heat reflection layer

111: heat reflection material

12: heat insulating layer

122: closed cell

13: base cloth

133: fabric

14: adhesive layer

19: thermoplastic resin material

2: topcover-basecloth

21: canvas

29: thermoplastic resin material (coating)

3: backing cloth

4: strap

5: welded portion

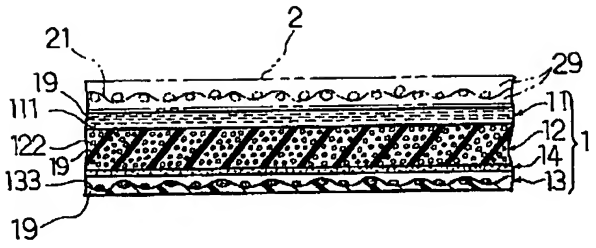
6: sewn portion

8: planar fastener

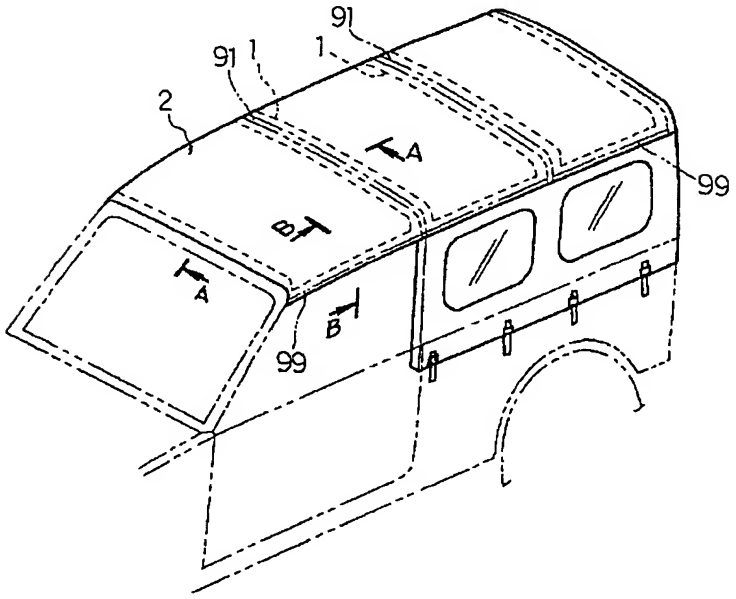
91: cross frame

99: side frame

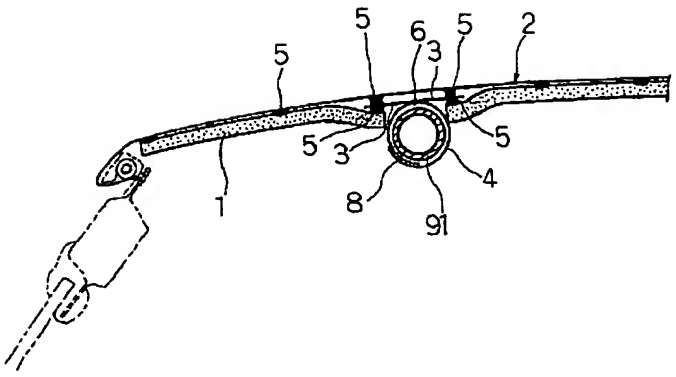
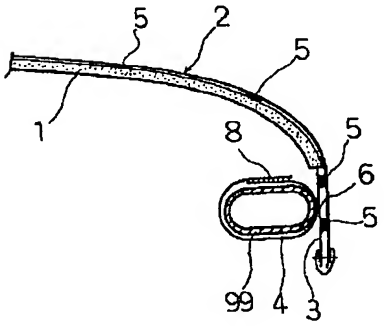
[Fig.1]



[Fig.2]



[Fig.3]



[Fig.4]